



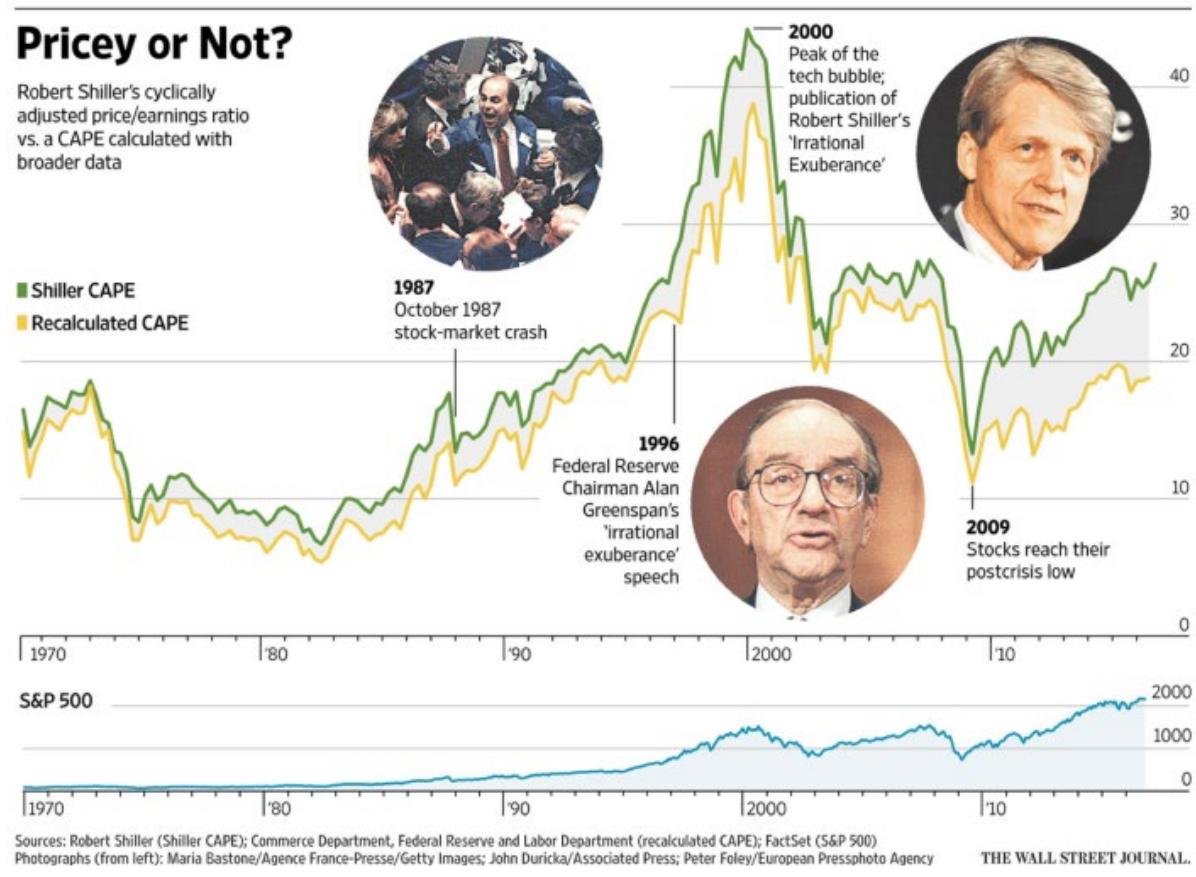
# New Fundamental Analysis Revisited Buffett-Graham-Dodd

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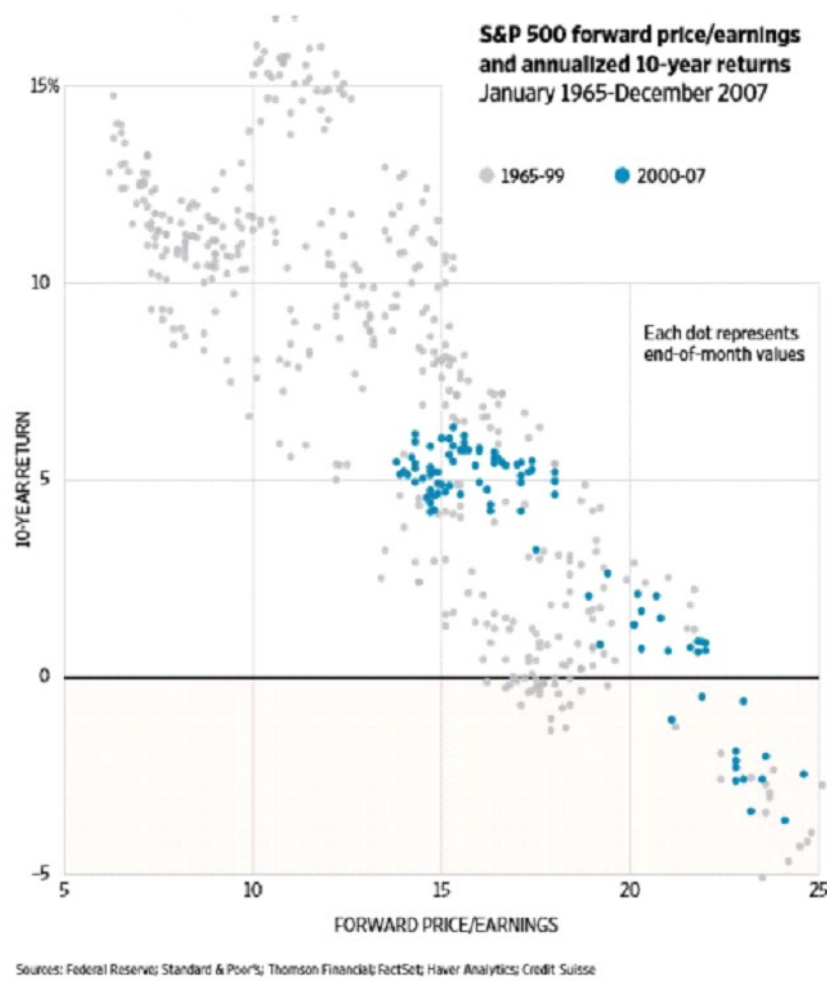
## Abstract

Fundamental Analysis has been the core of investing many years. One of the most important and popular measure is Price-Earning ratio, which measure the stock price is over-valued or under-valued. But recent change in investing world needs to modify traditional Fundamental Analysis. This Price/Earning ratio is commonly used by former Fed chairman Greenspan and Nobel laureate Shiller to value over/under priced stock valuation.



## PE ratio Valuation

Below shows the lower the PE ratio the bigger the stock returns.



## Buy Low PE, Sell High PE

### Buy Low, Sell High

S&P 500 average annual returns, 1926-2013

At lowest decile of Shiller P/E

21.6%

All years

12.1

At highest decile of Shiller P/E

1.7

Sources: WSJ analysis of FactSet and Ryan ALM data; Professor Robert Shiller  
The Wall Street Journal

Source: Oxford Economics

THE WALL STREET JOURNAL.

## Other Factor: Growth

### Not One of the Gang

Price-to-earnings-to-growth ratios

Symbol	Forward P/E	PEG Ratio (5yr expected)
AAPL	13.65	1.15
AMZN	41.46	1.36
GOOGL	20.60	1.34
GOOG	20.53	1.33
MSFT	22.52	1.76
FB	18.19	1.29
BABA	27.25	55.30

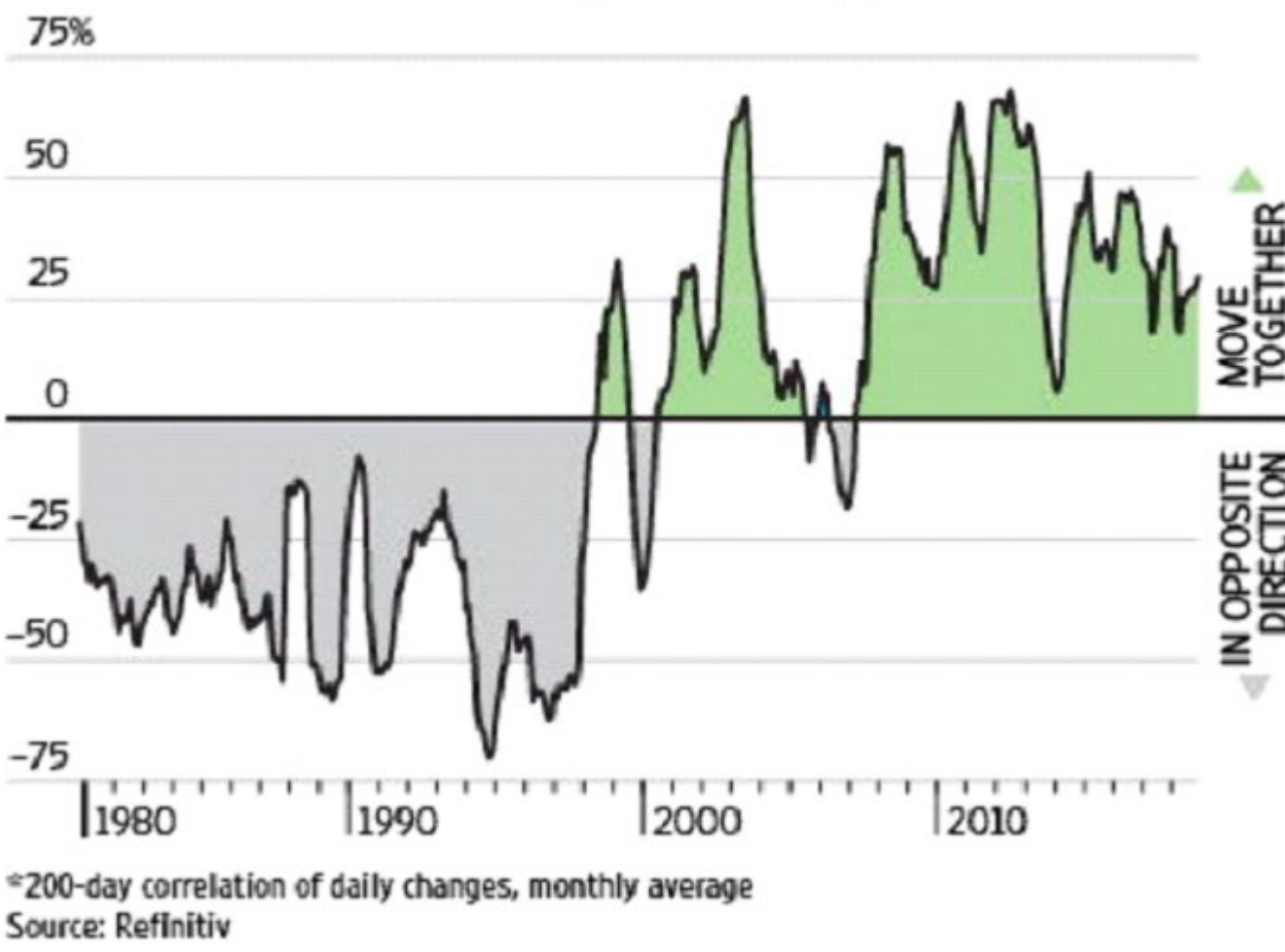
By using PE ratio AMZN(Amazon) looks very expensively over-valued, which mislead investing decision. But using growth adjusted PEG ratio shows that Amazon is not over valued. Chinese tech company Alibaba(BABA) looks overvalued

## Other Factor: Correlation

### Out of Sync

U.S. stocks and Treasuries are moving less tightly together.

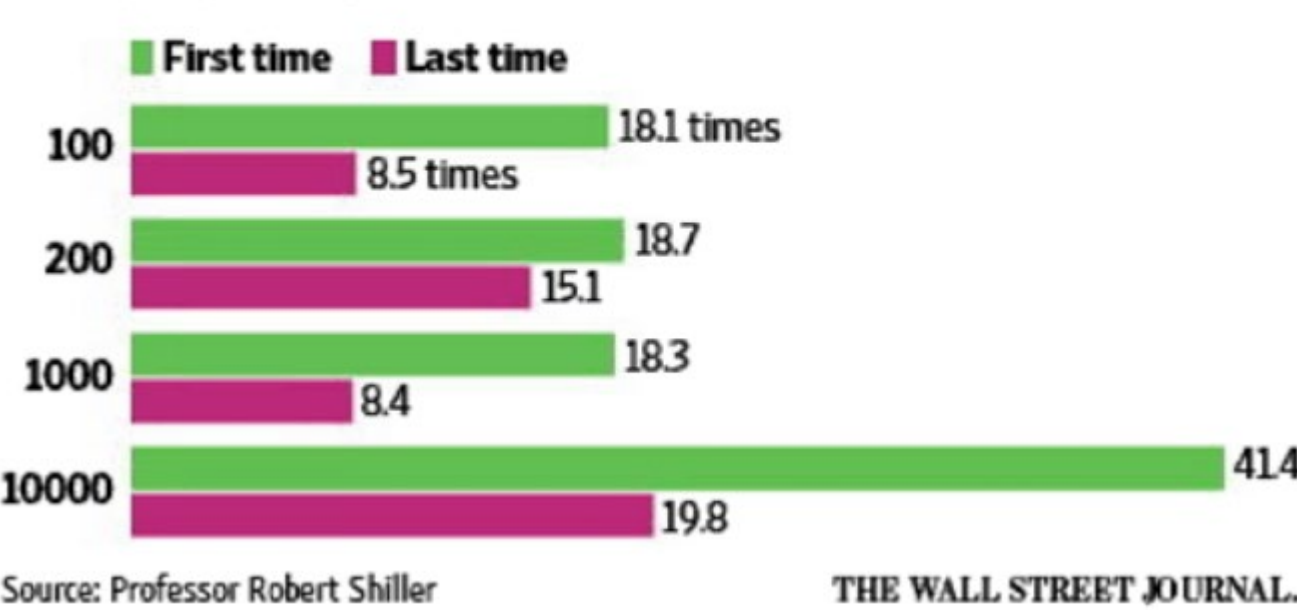
Correlation of S&P 500 and 10-year Treasury yield\*



Recent changes in correlation also make traditional PE matrix needs to be changed.

### Better the Second Time

Shiller price/earnings ratio at various Dow milestones



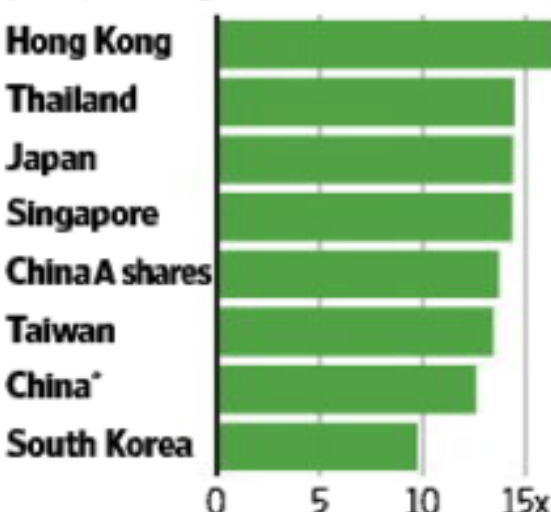
This shows over-valued stocks also return to mean PE ratio.

## Factor: Korean Discount

What will be the impact of political and geographical risk on investing. Recent Trump-Kim meeting is an example to lower Korean stock price with same earnings.

### Korean Discount

Corporate forward price/earnings ratio



## Graham-Dodd Model

Their PE-matrix model gives fair PE ratio to value stock price over/under valuation.

30yr Yield		Graham & Dodd P/E Matrix									
		Expected 5-year Annual Growth Rate (%)									
		0	5	10	15	20	25	30	35	40	
1%	37.4	81.4	125.4	169.4	213.4	257.4	301.4	345.4	389.4		
2%	18.7	40.7	62.7	84.7	106.7	128.7	150.7	172.7	194.7		
3%	12.5	27.1	41.8	56.5	71.1	85.8	100.5	115.1	129.8		
4%	9.4	20.4	31.4	42.4	53.4	64.4	75.4	86.4	97.4		
5%	7.5	16.3	25.1	33.9	42.7	51.5	60.3	69.1	77.9		
6%	6.2	13.6	20.9	28.2	35.6	42.9	50.2	57.6	64.9		
7%	5.3	11.6	17.9	24.2	30.5	36.8	43.1	49.3	55.6		
8%	4.7	10.2	15.7	21.2	26.7	32.2	37.7	43.2	48.7		
9%	4.2	9.0	13.9	18.8	23.7	28.6	33.5	38.4	43.3		
10%	3.7	8.1	12.5	16.9	21.3	25.7	30.1	34.5	38.9		
11%	3.4	7.4	11.4	15.4	19.4	23.4	27.4	31.4	35.4		
12%	3.1	6.8	10.5	14.1	17.8	21.5	25.1	28.8	32.5		
13%	2.9	6.3	9.6	13.0	16.4	19.8	23.2	26.6	30.0		
14%	2.7	5.8	9.0	12.1	15.2	18.4	21.5	24.7	27.8		
15%	2.5	5.4	8.4	11.3	14.2	17.2	20.1	23.0	26.0		
16%	2.3	5.1	7.8	10.6	13.3	16.1	18.8	21.6	24.3		
17%	2.2	4.8	7.4	10.0	12.6	15.1	17.7	20.3	22.9		
18%	2.1	4.5	7.0	9.4	11.9	14.3	16.7	19.2	21.6		
19%	2.0	4.3	6.6	8.9	11.2	13.5	15.9	18.2	20.5		
20%	1.9	4.1	6.3	8.5	10.7	12.9	15.1	17.3	19.5		

## New Model for Price/Earnings Matrix

$$P/E = (\alpha + 2x\text{Growth}) \times \beta/\text{Yield}$$

Where P/E means Stock Price over Earning per Share. Alpha is a constant derived from simulation of historic data. Beta is another constant also derived from simulation of historic data. Growth means expected earnings growth and yield is long-term 10 year government bond yield.

10yr Yield		Revised P/E Matrix									
		Expected 5-year Annual Growth Rate (%)									
		0	5	10	15	20	25	30	35	40	
1%	25.4	58.4	91.4	124.4	157.4	190.4	223.4	256.4	289.4		
2%	12.7	29.2	45.7	62.2	78.7	95.2	111.7	128.2	144.7		
3%	8.5	19.5	30.5	41.5	52.5	63.5	74.5	85.5	96.5		
4%	6.4	14.6	22.9	31.1	39.4	47.6	55.9	64.1	72.4		
5%	5.1	11.7	18.3	24.9	31.5	38.1	44.7	51.3	57.9		
6%	4.2	9.7	15.2	20.7	26.2	31.7	37.2	42.7	48.2		
7%	3.6	8.3	13.1	17.8	22.5	27.2	31.9	36.6	41.3		
8%	3.2	7.3	11.4	15.6	19.7	23.8	27.9	32.1	36.2		
9%	2.8	6.5	10.2	13.8	17.5	21.2	24.8	28.5	32.2		
10%	2.5	5.8	9.1	12.4	15.7	19.0	22.3	25.6	28.9		
11%	2.3	5.3	8.3	11.3	14.3	17.3	20.3	23.3	26.3		
12%	2.1	4.9	7.6	10.4	13.1	15.9	18.6	21.4	24.1		
13%	2.0	4.5	7.0	9.6	12.1	14.6	17.2	19.7	22.3		
14%	1.8	4.2	6.5	8.9	11.2	13.6	16.0	18.3	20.7		
15%	1.7	3.9	6.1	8.3	10.5	12.7	14.9	17.1	19.3		
16%	1.6	3.7	5.7	7.8	9.8	11.9	14.0	16.0	18.1		
17%	1.5	3.4	5.4	7.3	9.3	11.2	13.1	15.1	17.0		
18%	1.4	3.2	5.1	6.9	8.7	10.6	12.4	14.2	16.1		
19%	1.3	3.1	4.8	6.5	8.3	10.0	11.8	13.5	15.2		
20%	1.3	2.9	4.6	6.2	7.9	9.5	11.2	12.8	14.5		

We derived alpha and beta for Korean stock market and this shows lower Price Earning ratio than original Graham PE matrix.

## CONCLUSION

We modify Buffett-Graham-Dodd Price Earning ratio matrix model, so new model can reflect factor specific risk.

Example we used was Korean Discount model. Due to Korean geographical risk which is shown recently by Trump-Kim denuclearization meeting also, Korean stock prices are generally lower than counterpart US stocks due to this risk. To reflect this risk, we need to modify original PE matrix to value Korean stocks for investing. Our model shows lower PE ratio after reflecting this risk.